

Serial No. 10/662,809  
Docket No. T36-159069M/RS

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REMARKS

Claims 1, 3, 4, 6-15, 17 and 18 are all the claims presently pending in the application. Claims 1, 3, 8 and 9 have been amended to more particularly define the invention. Claims, 2, 5 and 16 have been canceled without prejudice or disclaimer.

Entry of this Amendment is believed proper since no new issues are being presented to the Examiner that would require further consideration and/or search.

Applicants specifically state that no amendment to any claim herein should be construed as a disclaimer of any interest in or right to an equivalent of any element or feature of the amended claim.

Claims 1, 2, 8 and 9 stand rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. Claims 1-18 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Tischler et al. (U.S. Patent Application Publication No. 2002/0028314; hereinafter "Tischler").

These rejections are respectfully traversed in the following discussion.

**I. THE CLAIMED INVENTION**

The claimed invention of exemplary claim 1, provides a method of producing a Group III nitride compound semiconductor substrate including forming a first Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method directly on a silicon (Si) substrate or after forming a buffer layer on said silicon substrate and forming a second Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method at a temperature of not lower than 1000°C after removing substantially the whole of the silicon substrate (e.g., see Application at page 7, lines 20-25). This feature is important for relaxing the stress between the silicon substrate and the first Group III nitride compound semiconductor so that the stress is substantially absent (see Application at page 6, lines 5-18).

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## II. THE 35 U.S.C. 112, FIRST PARAGRAPH, REJECTION

The Examiner has rejected claims 1, 2, 8 and 9 under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Specifically, the Examiner alleges that there is no support for "*a halide vapor-phase epitaxy method*", as recited in the claimed invention, because the Application teaches that the HVPE process utilizes HCL etchant in carrying out the claimed "*halide*" process. The Examiner, however, is clearly incorrect.

Indeed, the Application clearly discloses that the silicon substrate (e.g., 1, we point out that reference numerals are merely provided herein for exemplary purposes for the convenience of the Examiner and are not meant to limit the scope of the claimed invention in any manner) having the AlGa<sub>N</sub> layer (e.g., 2) and the Ga<sub>N</sub> layer (e.g., 3) is set in a halide VPE apparatus. While the halide vapor-phase epitaxial growth of a Ga<sub>N</sub> layer (e.g., 10) is performed from an upper surface of the silicon substrate (e.g., 1) by GaCl and ammonia, a rear surface of the silicon substrate (e.g., 1) is gas-etched with hydrogen chloride (e.g., see Application at page 10, lines 8-20).

The Application teaches two separate and distinct steps of forming a first Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method and removing substantially a whole of the silicon substrate by etching a rear surface of the silicon substrate. As is clearly disclosed in the Application, the hydrochloric acid (HCl) is used to etch the rear surface of the silicon substrate, not to form the first Group III nitride compound semiconductor layer, as alleged by the Examiner.

Indeed, the first Group III nitride compound semiconductor layer is formed by a halide vapor-phase epitaxy method using GaCl, which is a halide. Thus, the Application

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clearly provides support for forming a first Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method, as recited in the claimed invention.

In the Response to Arguments section of the Office Action dated July 18, 2006 the Examiner alleges that "Applicants never put forth evidence to suggest the contrary that the HCl is known to be used as a hydride and not a halide agent. Applicants' contend that its use is in a halide vapor phase epitaxy, however examiner put forth the argument that the term was used incorrectly" (see Office Action dated July 18, 2006 at page 7). The Examiner, however, is clearly incorrect.

That is, Applicants submit that the Examiner has clearly mischaracterized Applicants' arguments. That is, Applicants clearly pointed out that the HCl is not used in the vapor-phase epitaxy method (which is in direct contradiction to the Examiner's erroneous allegations above). Instead, we pointed out that the HCl is used for removing substantially a whole of the silicon substrate by etching a rear surface of the silicon substrate. Thus, nowhere does the Application refer to HCl as a halide agent as erroneously alleged by the Examiner.

Furthermore, the Examiner alleges that "applicant has introduced a set of ranges 800-900° in specifically claims 1, 8 and 9 but has the specification stated that the process neither occur above or below the 1000°C range. This would be in clear contradiction of what is stated in the specification" (see Office Action dated July 18, 2006 at page 3). The Examiner, however, is clearly incorrect.

That is, Applicants submit that the Examiner has clearly mischaracterized the claimed invention as well as the written description provided in the Application. That is, the Application clearly states that "the first layer forming is carried out at a temperature of not higher than 1000°C whereas the second layer forming step is carried out at a temperature of not lower than 1000°C. More preferably, the first layer forming step is carried out at a

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temperature of from 800°C to 900°C” (see Application at page 7, lines 20-24). Therefore, the Application clearly provides support for the temperature range recited in claims 1 and 8.

Therefore, Applicants request the Examiner to reconsider and withdraw this rejection.

### III. THE PRIOR ART REJECTION

The Examiner alleges that Tischler teaches the claimed invention of claims 1-18.

Applicants submit, however, that Tischler does not teach or suggest each and every feature of the claimed invention.

That is, Tischler does not teach or suggest “*forming a second Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method at a temperature of not lower than 1000°C after said removing substantially the whole of said silicon substrate*”, as recited in claim 1, and similarly recited in claims 8 and 9.

The Examiner attempts to rely on paragraphs [0002]-[0021] and [0051] of Tischler to support his allegation. The Examiner, however, is clearly incorrect.

That is, nowhere in this passage (nor anywhere else for that matter) does Tischler teach or suggest forming a first Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method directly on a silicon (Si) substrate or after forming a buffer layer on said silicon substrate and forming a second Group III nitride compound semiconductor layer by a halide vapor-phase epitaxy method at a temperature of not lower than 1000°C after removing substantially the whole of the silicon substrate. Indeed, the Examiner does not even allege that Tischler teaches or suggests this feature of the claimed invention.

The claimed invention recites forming a first Group III nitride compound semiconductor layer at first temperature and then forming a second Group III nitride compound semiconductor at a second temperature, which is different from the first temperature. This feature is not taught or suggested by Tischler.

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Indeed, Tischler does not even teach or suggest forming a second Group III nitride compound semiconductor layer. The Examiner alleges that this feature is taught in paragraph [0051] of Tischler. The Examiner, however, is clearly incorrect.

This passage of Tischler does not teach or suggest forming a second Group III nitride compound semiconductor layer. Paragraph [0051] of Tischler merely discusses known techniques for forming Group III nitride compound layers.

Furthermore, nowhere does Tischler teach or suggest forming a first Group III nitride compound semiconductor layer and a second Group III nitride compound semiconductor layer at different temperatures, let alone at the specific temperature ranges recited in the claimed invention.

Therefore, Applicants submit that Tischler does not teach or suggest each and every feature of the claimed invention. Therefore, the Examiner is respectfully requested to reconsider and withdraw this rejection.

#### IV. FORMAL MATTERS AND CONCLUSION

With respect to the objection to claims 5 and 16, Applicants submit that the Examiner has clearly mischaracterized the subject matter recited therein. Although Applicants have canceled claims 5 and 16, Applicants provide the following remarks to clarify the subject matter recited in claims 5 and 16, which has been incorporated into the independent claims.

The Examiner alleges that claims 5 and 16 are of improper dependent form. Specifically, the Examiner alleges that “[b]oth claims 1 and 8 refer to temperature limitation ranges from 800-900°C, however claims 5 and 16 refer to ranges that occur at a temperature of not lower than 1000° which would contradict the range specified in their respective parent claims” (see Office Action dated July 18, 2006 at page 2). The Examiner, however, is clearly incorrect.

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That is, the temperature range (i.e., 800°C-900°C) recited in claims 1 and 8 refers to the temperature at which the first Group III nitride compound semiconductor layer is formed. In stark contrast, the temperature range (i.e., not lower than 1000°) recited in claims 5 and 16 (now incorporated into the independent claims) refers to the temperature at which the second Group III nitride compound semiconductor layer is formed. Indeed, the claimed invention (as clearly described throughout the specification) includes forming a first Group III nitride compound semiconductor layer and a second Group III nitride compound semiconductor layer, which are each formed at different temperatures. This feature is clearly recited in the claimed invention.

Therefore, Applicants submit that the claim limitations recited in dependent claims 5 and 16 (now incorporated into the independent claims) are clearly not contradictory to the claimed invention of claims 1 and 8, as suggested by the Examiner. In stark contrast, Applicants submit that the Examiner has merely mischaracterized the claimed invention.

Therefore, Applicants request the Examiner to reconsider and withdraw this objection.

In view of the foregoing, Applicants submit that claims 1-18, all of the claims presently pending in the application, are patentably distinct over the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview.

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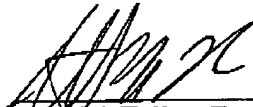
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The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Attorney's Deposit Account No. 50-0481.

Respectfully Submitted,

Date: October 10, 2006

  
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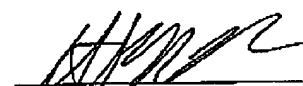
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**FACSIMILE TRANSMISSION**

I hereby certify that I am filing this paper via facsimile, to Group Art Unit 1722, at (571) 273-8300, on October 10, 2006.

Respectfully Submitted,

Date: October 10, 2006

  
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